A COMPARISON OF THE DIET OF A SELECTED GROUP OF GRADE CHILDREN LIVING IN A BOARDING SCHOOL WITH THOSE OF A SIMILAR GROUP OF DAY STUDENTS

by

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CHAPTER I

INTRODUCTION

Many studies have recently been made on the nutritive value of American diets, and on the importance of good food habits. Two quotations indicate the present attitude toward nutrition.

> If health is the first objective in education, then nutrition stands first among subjects for instruction. Nutrition deals with material matters. The substances used, and the way in which they are used are the first concern in the making of any machine. The human mechanism is the most delicate and the most important of all machines. [1]

And as stated by Minot, "Man's future depends very largely upon what he decides to eat". [2]

It is apparent, therefore, that the child should be fed, not only for his present good, but also for his future contribution as a parent to the improvement of the race.

Heretofore there have been many dietary studies and surveys made among high school children, but comparatively few with the children from the intermediate grades. The present study is an evaluation of the dietary practices of thirty-four girls mostly between eight and eleven years of age, except for one who was twelve, and one thirteen.

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1. James F. Rogers, et al, "Nutritional Education Throughout the School Program," School Life, XXVI (February, 1941), 131.

2. Dr. George A. Minot, "Comments on Current Science" Scientific Monthly, XLVI (April, 1938), 374.

All the girls of the third, fourth, fifth and sixth grades of Sacred Heart Academy, and of the Cathedral School of Belmont, North Carolina were used. The Sacred Heart Academy is situated in the Piedmont section of North Carolina, eleven miles southeast of Charlotte, at an elevation of eight hundred feet. Including boarders and day students, the Academy has about 195 girls distributed from the first grade through junior college.

The majority of the boarding students in this study came from families of fairly good educational background but with rather limited income. Low income was often due to the fact that one parent was deceased, or that the parents were separated. In some cases remarriage has increased the burden of maintaining the family. Approximately one-half of the day students came from families of poor educational background, and low economic status, while the other half came from well educated and rather well-to-do families.

The purpose of the study is to show to what extent the boarders ate the food offered and to compare their dietary habits with those of the day students of the same grades. The study likewise endeavored to ascertain the relation of their diets to growth, and to the amount of illness.

Food consumption records were secured for three three-day periods, one in October, 1946, one in January, and one in April, 1947. These records were evaluated by a score card based on the food groups recommended by the Bureau of Human Nutrition and Home Economics. Whole grain bread and flour, however, were not included, as they were enriched at the time. Height and weight records were also kept. Progress in growth was determined by the relation of actual gains to that expected for the year. Absences from school and the causes were recorded.

CHAPTER II

REVIEW OF LITERATURE

"For more than twenty-five years there has been research and ever-broadening education (in the field of nutrition), yet statistics indicate that nearly one-third of the nation is still inadequately fed".[1]

In this review of literature related to the present study, an attempt is made to give a picture of the national nutrition situation for grade school children and also to see if diet has any relation to absences.

In the year 1939 Stiebeling and Phipard [2] reported expenditures for food among wage earners and low income clerical workers living in forty-three industrial centers in eight major geographical areas of the United States. On the basis of food purchased the diets were rated as good, fair and poor. It was found that from forty to sixty-four of every hundred families in the survey were subsisting on poor diets.

Hardy [3] made a one-week study of the diets of 100 families in Snohomish County, Washington in September, 1943. The families lived in

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1. James F. Rogers, et al, "Nutritional Education Throughout the School Program," School Life, XXVI (February, 1941), 131.

2. Hazel K. Stiebeling, Esther F. Phipard, Diets of Families of Employed Wage Earners and Clerical Workers in Cities, Circular 507, U.S. Department of Agriculture, Washington, D.C. (January, 1939), p. 99.

3. Frances Hardy, "Study of the Dietary Level of 100 Families", Journal of Home Economics, XXXVII (June, 1945), 351-354.

cities, small towns, rural communities and on farms, and included 428 persons of which 213 were twenty years of age or under. Of all the families studied, only thirty-six met the recommended allowance of the National Research Council for every dietary essential. More than one-third of the families were below the recommended level of calcium, more than one-fourth in calories and riboflavin and more than one-fifth in niacin. The diets of farm and other rural families were slightly better than those of city ones, with 58 per cent and 60 per cent respectively of the rural people not meeting recommendations as compared to 69 per cent of the city families. These diets would seem to be better in some respects than those studied by Stiebeling.

A study was made by Peterson [4] of 1624 boys and girls in Chicago which showed that 73 per cent had a pint or more of milk daily, 43 per cent had three or more servings of vegetables and fruits, and 90 per cent had at least one serving of meat or other protein food. She also found that many pupils had little variety in the kinds of vegetables and fruits they were served, for in some families potato was the only vegetable eaten during the week.

Leichsenring, Donelson, Deinard, Pittman, Coprider and Haggart [5] made a seven-day study of the diets of 524 high school girls in Minnesota and Kansas during the years 1939 and 1940. The food selection of both

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4. Agnes B. Peterson, "Food Habits of Sixth and Seventh Grade Children in Ten Elementary Schools of Chicago", Research Quarterly, IX, (December, 1938), 77.

5. Jane M. Leichsenring, et al, "Diets of 524 High School Girls", Journal of Home Economics, XXXV, (November, 1943), 583.

the Minnesota and the Kansas girls showed certain definite deficiencies. More than one-fourth of the Minnesota and more than one-fifth of the Kansas diets contained no eggs during the period of study. Nearly one-third of the Minnesota and more than one-half of the Kansas subjects consumed less than one serving of milk per day. Meat was more generously used by the Minnesota than by the Kansas girls. Green and yellow vegetables were lacking in all diets; almost 90 per cent of the Kansas group and more than 80 per cent of the Minnesota group had less than one serving daily.

A survey [6] was made in twenty-one counties in Illinois of the food habits of 14,658 school children ranging in age from six to eighteen years. These children were enrolled in city, town and rural schools. Two types of survey forms were used: the first was a one-to-seven day check list of "basic seven" foods; the second form was a twenty-four-hour record on which each child listed all the food he had consumed in that period. The check list was kept by 10,473 children from eighteen counties and the twenty-four-hour record by 9374 children from twelve counties. Analysis of the check list revealed that the children were farther from reaching the goal set for the consumption of milk and milk products than from any other food group. The consumption of meat and meat substitutes ranked highest, with an average of 83 per cent. Fifty per cent of the children ate the recommended number of servings of fruits and

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6. Annette Y. Feldman, Gertrude Kaiser, "Diet Surveys to Revive Nutrition Programs", Journal of Home Economics, XXXVIII, (October, 1946), 517.

vegetables and only 43 per cent reported eating an egg a day.

Coco, Moore, Goldsmith, Lucas, and Davis [7] made a study of the dietary habits of grade school and high school students of Louisiana in the spring and early summer of 1942. Records were secured from 5776 children in New Orleans schools, 387 from Crowley High School, and 545 from grade schools and high schools in other areas of the state. Taking all the diets of white students as one group, the consumption of meat ranked highest, milk ranked second, and the other foods followed in the order given: green or yellow vegetables, eggs, other fruits and vegetables, citrus fruit, and butter. As a group, the diets consumed by the negro students were much poorer than those consumed by the white students. However, the rank of the protective foods in the negro diets was quite similar to the diets of the white students with the exception of milk. Milk ranked second with the white students, whereas with the negro students it ranked seventh. The students in Crowley High School had a higher percentage scoring fair, and fewer scoring poor, than the students from the other schools studied. The number scoring good, in each group, was small. Fifty-eight per cent of the diets of negro students in New Orleans scored poor and 75 per cent of the diets of negro students in other areas of the state scored poor.

In Chicago from January, 1939 to August, 1941, Hardy and co-

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7. Lucille D. Coco, et al, A Study of the Adequacy of Diets Consumed by Grade School and High School Students in Louisiana, Louisiana Bulletin, 360 Louisiana State University, (January, 1943), p. 8.

workers [8] made a survey which included 7363 children. The children represented families of all socio-economic levels, ranging from relief status to those with incomes in excess of $10,000.00. It was found that 92 per cent of the children from the lowest income level had inadequate diets, while at the highest levels, 41 per cent had inadequate diets. Dietary inadequacies were least often noted in the protein foods and most often in fruits and vegetables.

A survey [9] of the nutritive status of 386 Vermont school children selected as representative of rural and urban groups of various ages and economic levels was made in September and October, 1944. Records of the food intake for one day showed the greatest fault to lie in the low intake of fruits and vegetables. Blood studies revealed that 25 per cent of a group of 176 had plasma vitamin C levels below 0.6 mg. per 100 cc., while 40 per cent of the entire group had inflamation of the gums. About 85 per cent of the entire group exhibited one or more abnormalities usually associated with rickets.

That malnutrition is not limited to low-income families has been emphasized by many. Boyer [10] in her study of eighty so-called normal

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8. Martha C. Hardy, et al, "Nutritional and Dietary Inadequacies Among City Children from Different Socio-Economic Groups", Journal of American Dietetic Association, XIX (March, 1943), 173.

9. H.P.Pierce, et al, "Nutritional Defects Among Children in Vermont", New England Journal of Medicine, CCXXXIII (November 22, 1945), 612-617.

10. Leona M. Boyer, "The Diets of Adolescent Girls with Special Reference to Nutritional State and Dental Caries", Journal of Pediatrics, XVI January, 1940), 67.

adolescent girls mostly from the middle class, found that their diets were generally poor, furnishing on the average only about two-thirds of the recommended daily allowances of specific nutrients. The principal deficiencies were in vegetables, fruits, milk and whole grain cereals, and these foods were replaced largely by starches. In the same year, Zayoz and co-workers [11] in a study of dietary habits and nutritional status of 428 children of families where low income prevailed, likewise found that the children's diets were made up largely of potatoes and white bread, and the greatest deficiencies were in citrus fruits, milk and meat. These findings can be interestingly compared with a report of Mack and co-workers.[12] They used for their subjects 147 children in a college town of about 7000 inhabitants. Included in the study were all those in the fifth grade during 1937-38, as well as representative intermediate grade children in a summer session demonstration school in 1938. In the industrial center low incomes prevailed; in the college community comparatively few people of extremely low incomes were to be found, and the educational ratings of the adults were exceptionally high. The children in the college community were found to ex-

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11. S.L.Zayoz, et al, "Nutritional Status of School Children in a Small Industrial City", Child Development, XI (March, 1940), 23.

12. P.B.Mack, et al, "Mass Studies in Human Nutrition; Nutritional Status of Children in a College Community", Journal of American Dietetic Association, XVIII (February, 1942), 78.

hibit a better nutritional status. Although the intake of certain protective foods varied with the different income groups in both communities, there was a higher intake of these protective foods throughout all income groups of the college community. Dietary records and laboratory tests even in this community, however, showed that all the children were not in maximum nutritional well-being, proving that even among more privileged families there is still room for improved eating habits in growing children.

Gilbert, in explaining what a nutrition program means, makes this statement:

> Proper feeding not only reduces absences but increases efficiency. How can children do their best work without the energy that comes from good food? An acknowledged relationship exists between a well-fed child and a satisfactory achievement. [13]

Rogers, Mackintosh, and Burson, in advocating a nutrition program in schools, relate:

> Poor nutrition results in physical and mental ineffectiveness. Experiments with such unfortunates among school children, by supplying nutritional deficiencies, have resulted in better attendance, more energy, less fidgetiveness, less timidity, less listlessness, better attention and memory, to say nothing of better motor control and zest for play. In a word, improved nutrition (other things being equal) makes life more worth living. [14]

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13. Edna Gilbert, "What a Nutrition Program Means", Nation's School, XXXI (March, 1943), 49.

14. James F. Rogers, et al, "Nutritional Education Throughout the School Program", School Life, XXVI (February, 1941), 131.

These statements do not coincide with the findings of Moser [15] in a study for one and one-third years in two rural elementary schools in the upper Piedmont section of South Carolina, where forty-nine children one school were served a partial lunch, thirty-seven children in the other school were served a complete lunch. As stated by Moser:

> No significant difference in the attendance records of the two schools was observed during the study. Other factors than the type of lunch served at school probably determined regularity of attendance. Among these was ease of getting to school in bad weather, the number of days older boys were kept out for farm work, the incidence of illness, and the ability of families to provide clothes suitable for going to school in all types of weather. [16]

Ciacco, Cameron, and Bell [17] in a study of the causes of school absences in Hagerstown, Maryland, comparing the years 1921-1925, 1935-1936, and 1939-1940, found that the sickness case rate in 1935-36 from all causes increased by 12 per cent, and in 1939-40 by 37 per cent over the rate recorded in 1921-25. The higher case rate observed in recent years results primarily from a marked increase of absences due to colds and digestive disorders. In 1939-40 the rate of colds was 72 per cent greater than 1921-25 and for digestive disorders it was 92 per cent.

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15. Ada M. Moser, Nutritional Condition of Children in Relation to School Lunches in Two South Carolina Communities, Bulletin 359, South Carolina Agriculture Experimental Station of Clemson Agricultural College, Clemson, South Carolina, p. 4.

16. Ibid., p. 17.

17. Antonio Ciacco, W.R.Cameron, and E. Bell, "A Comparison of the Morbidity of Hagerstown, Maryland School Children in 1921-1925, 1935-1936, 1939-1940", Milbank Memorial Fund Quarterly, XIX (October, 1941), 400.

A study of the same community, comparing the years 1940-45 with those of 1921-25 shows that there was an increase of 15 per cent in absences due to sickness, but there was a marked reduction (30 per cent) in the days lost for reasons other than sickness.[18]

The general sources in the review of literature included:

Palfrey and Coleman, Guide to Bibliographies of Theses
United States Library of Congress, List of American Doctoral Dissertations Accepted by American Universities
Monroe, Walter Scott, Illinois University Bureau of Educational Research, Ten Years of Educational Research, 1918-1927
Ruth Gray, United States Office of Education, Library Bibliography of Research Studies in Education
Ruth Gray, Doctors' Theses in Education
Ruth Gray, Recent Theses
Columbia University Teachers' College, Register of Doctrinal Dissertations
New York University, List of Doctors' and Masters' Theses in Education
Northwestern University, List of Doctoral Dissertations
Monroe and Shores, Bibliographies and Summaries in Education to July, 1935
Education Index
The Bibliographic Index
Standard Catalogue for Public Libraries
List of Books for College Libraries
Shaw, List of Books for College Libraries, 1931-38
Studies in Home Economics Education, 1918-1940
Notes on Graduate Studies in Home Economics
Journal of Educational Research
Monroe and Asher, Bibliography of Bibliographies
Iowa State College Library, Basic Books and Periodicals in Home Economics

United States Office of Education, Abstracts of Studies in Home Economics, 1934-1938
United States Office of Education, Abstracts of Theses in Home Economics Education Reported by Colleges and Universities, 1931-1934

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18. Isidore Altman and A. Ciocco, "School Absences Due to Sickness in the War Years", Child Development, XVI (December, 1945), 198.

United States Department of the Interior, Bibliography of Studies of the Home Economics Curriculum
Munsell, Titles of Unpublished Theses in the Field of Home Economics Completed, 1924-1931
Quarterly Cumulative Index Medicus, 1932-1945
Public Affairs Information Service Annual Cumulate Bulletin, 1923-1943
Nutrition Abstracts and Reviews, 1935-1946

Chapter III

METHODS

Menus at the academy were under the supervision of a dietitian, and meals were served in two dining rooms, one for grades and one for high school and junior college. The students were served family style, at tables seating six or eight, and meals included all food groups recommended for daily consumption. The younger children were served by the Sister in charge of the dining room at the time. Day students, if they so wished, could obtain the regular dinner served to the boarders, and could eat in the same dining room. However, the greater number preferred to bring their own lunch, or to buy sandwiches, cookies, etc. in the soda shop. Boarders were required to eat regular meals in the school dining room. They were, nevertheless, allowed to visit the soda shop, which is owned and operated by the school, after meal and school hours. They seldom, however, came after meals. Milk and soup were offered but generally were not desired. The students preferred "cokes" or other soft drinks. There was no supervision of those who did not eat in the regular dining room. Of the seventeen day students whose records were kept, two ate in the boarders' dining room, four went home for lunch, and the other eleven brought lunch from home or patronized the soda shop.

Three three-day diet records were collected, the first during the fourth week of October, the second in the third week of January, and the third in the last week of April. Before the first period a

group conference of all students from third, fourth, fifth and sixth grades was held. The children were told that we wanted to find out what little girls ate, and were asked if they would like to help by filling in the papers. All of the students cooperated willingly. The importance of including between-meal foods and of recording accurate quantities was stressed and the size of servings used in the dining room demonstrated. The children's diet records were examined each day to ascertain completeness and to make sure they were reporting what they had actually eaten, and not merely the menu that had been served. No influence was brought to bear on the children in order to make the records harmonize with accepted dietary standards. A copy of the diet record form used may be found in the Appendix.

The diet records were evaluated by comparison with the food groups recommended by the Bureau of Human Nutrition and Home Economics. The standard set was an adequate rather than an optimum one. Evaluation of the child's diet was based on all three periods except in one or two cases where one period was most unusual due to a case of measles. In these cases the diet was judged on two periods only.

The data have been analyzed to compare the diet of boarders and day students, to determine a possible relation of good diet to growth and to absences from school. Activity records were taken in order that differences in activities of boarders and day students might be ascertained.

A record of day student absences and the reasons for them was obtained from the teachers. In the case of the day students the reasons for absences were those given on the parents' notes brought on the

children's return to school. For the boarding students the cause of absence was obtained from the resident nurse.

The height and weight of each child was taken on October 24, 1946 and on May 26, 1947. Shoes and outside wraps were removed before the child was weighed and measured. Growth was evaluated by comparison of the gains for the period with the expected gain for the year in Baldwin-Wood table. [1]

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1. Mary Swartz Rose, Feeding the Family, Fourth Edition. New York: MacMillan, 1940. p.405.

CHAPTER IV

RESULTS

Thirty-four records from students of grades three, four, five and six were obtained. Seventeen of these were boarders and seventeen were day students. The age distribution is given in Table I.

TABLE I

DISTRIBUTION OF STUDENTS ACCORDING TO AGE IN OCTOBER, 1946

Age	Number of Boarders	Number of Day Students
8	5	5
9	2	4
10	4	3
11	5	4
12	-	1
13	1	-

Inspection of the records showed the diets were generally poor. Consequently, they were rated on the basis of an adequate diet and not an optimum diet. The score card used is given in Table II.

TABLE II

SCORE CARD FOR AN ADEQUATE DIET

Food Group	Servings per Day
Milk and milk products	Three glasses
Green and yellow vegetables	1
Citrus fruit or tomatoes	1
Other fruit and vegetables	2
Meat or meat substitute	1
Butter or margarine	2
Eggs	2 for the three days

In order to obtain a rating by which the diets could be compared, a value of one was arbitrarily assigned to each food group. For example, if a girl drank three cups of milk for each of the three days, her rating was one for that food for that period. If she drank less than three cups, a fraction was given but no additional credit was allowed for a larger quantity. Thus, if a girl received a rating of seven for the period, she must have eaten the required amount of each food group for each of the seven days. The diet ratings are summarized in Table III.

TABLE III

DISTRIBUTION OF DIET RATINGS

Diet Rating	Fall		Winter		Spring		Average	
	*B	D	*B	D	*B	D	*B	D
1-1.9	-	1	-	-	-	1	-	-
2-2.9	-	3	-	4	-	2	-	3
3.3.9	-	6	**1	2	-	5	-	6
4-4.9	5	3	-	10	1	5	-	6
5-5.9	8	4	4	-	5	4	8	2
6-6.9	4	-	7	1	9	-	9	-
7	-	-	5	-	2	-	-	-
Total	17	17	17	17	17	17	17	17

* B, Boarders. D, Day Students.

** Alteration in regular diet pattern due to case of measles.

The diets of the boarders rated definitely better than those of the day students. The low rating of the day students reflects their tendency to eat too many servings of one food and too small a variety, thus omitting some groups entirely. Potatoes, string beans and pinto beans were the vegetables most often mentioned. Carrots and peas were recorded only nine times each. About a third of these children ate nothing but bread and milk, or bread and coffee for supper,

In the fall the academy could not buy butter or margarine. Hence, the highest score possible for that period was 6, not 7. Four of the boarders made this score and all made four or better. For the

same period, twelve of the seventeen day students made scores between 2 and 4.9. None ranked higher than 5.9. In the winter the diets of all but one of the boarders scored 5 or better, while 5 of them reached the highest possible score of 7. The one poor score was accounted for by illness at the time the diet record was taken. During the same period all but one of the diets of the day students scored below 5. The same general relationship held for the spring period.

For most of the students there was not a great deal of difference between the diet scores of the different periods. (See Appendix, Table V). It was therefore assumed that an average of the three periods would fairly represent the student's usual diet. In one case of a boarder autumn and spring only were averaged because of illness in the winter when the diet record was taken. For the boarders it should be remembered that an average score of 7 was impossible because of the absence of butter or margarine from the academy diet at that time. It is therefore a very creditable showing that all made an average score of 5 or above with 9 scoring between 6 and 7. Twelve of the day students scored 3 or 4.

Table IV shows the number of students eating the required amounts of the seven food groups. For every food group except meat or meat substitutes, the number of boarding students eating the required amount exceeded that of the day students. Both groups failed most often in including a green or yellow vegetable, although the boarding students did much better than the day students.

TABLE IV

NUMBER OF STUDENTS REPORTING AT LEAST REQUIRED NUMBER OF SERVINGS OF THE INDICATED FOOD IN EACH PERIOD

	Fall		Winter		Spring	
	*B	D	*B	D	*B	D
Milk, 3 c per day or more	12	2	10	-	14	1
1 serving green or yellow vegetables, or more	7	-	9	1	6	-
1 serving citrus fruit or tomato	11	6	13	5	10	3
2 servings other fruit or vegetables	16	4	15	3	12	1
1 serving meat or meat substitute	15	13	15	16	14	16
Butter or margarine	-	8	15	5	13	3
2 eggs for 3 days	14	8	14	6	15	13

* B, Boarders. D, Day Students.

It should be remembered that meals at the academy were planned to furnish adequate amounts of all the food groups. The day students generally included meat or meat substitute. Use of a large amount of meat and the neglect of fruits and vegetables is characteristic of this region. This was found true by Cora E. Gray [1] in Rowan County and

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1.Cora E. Gray, personal communication.

also by the State Health Department [2].

The better diets of the boarding students can be attributed first to the fact that an adequate diet was provided, and second , that the boarding students had learned to eat what was provided. Formerly, a part of the dining room supervision consisted in encouraging the girls to learn to like a variety of foods. While that phase of supervision was lacking in 1946-47, there certainly was some carry-over from former years. The day students who ate in the dining room generally failed to eat all of the meal provided.

Table V shows the record of foods eaten between meals, and the number of times the students indulged in between-meal eating. The school soda shop was open to both boarders and day students after school in the afternoons. The day students, however, very rarely patronized the shop, as they usually left school immediately after the last class.

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2. Unpublished data

TABLE V

NUMBER OF TIMES STUDENTS REPORTED INTAKE OF BETWEEN-MEAL FOODS IN EACH PERIOD

	Fall		Winter		Spring	
	*B	D	*B	D	*B	D
Cake	1	16	1	11	3	9
Candy	9	23	14	32	13	20
Carrots	2	1	-	-	-	-
Fruit	2	23	9	15	1	15
Ice Cream	26	8	25	6	20	5
Milk	-	3	-	4	-	6
Peanuts	-	1	2	2	-	-
Peanut butter crackers	-	1	1	1	-	-
Pie	-	1	-	2	-	1
Pop Corn	3	3	-	1	-	1
Potato Chips	-	3	-	2	2	-
Pretzels	2	1	2	1	2	-
Sandwiches	-	3	-	6	-	7
Soft drinks	1	13	2	7	5	13
Total	46	100	56	90	46	77

According to Table V the intake of between-meal foods and sweets was less on the part of the boarders. The smaller use of these foods by the boarders may, perhaps, be related to their better diet. The

findings of Macy [3] support the contention that improvement in diet results in a smaller intake of sweets.

TABLE VI

NUMBER OF STUDENTS WHOSE COMBINED GROWTH IN HEIGHT AND WEIGHT FELL WITHIN INDICATED PER CENT OF THAT EXPECTED FOR THE YEAR

Diet Rating	Boarders				Day Students			
	74% or less	75%-124%	125%-174%	175% or over	74% or less	75%-124%	125%-174%	175% or over
1	-	-	-	-	-	-	-	-
2	-	-	-	-	1	1	1	-
3	-	-	-	-	-	2	1	2
4	-	-	-	-	1	1	3	2
5	-	3	4	1	-	-	1	1
6	-	1	3	5	-	-	-	-
7	-	-	-	-	-	-	-	-
Total	0	4	7	6	2	4	6	5

Children at the academy are weighed regularly. For this study the height-weight records for October 24, 1946 and May 26, 1947 were used. In order to judge growth, the gains in height and weight for the seven-months period were compared with what the child might be expected to gain in a year. This relationship was expressed as a per

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3. I. Macy, Nutritional and Chemical Growth in Childhood, Vol. I, Springfield, Illinois: Charles C. Thomas, 1942.

cent and since children often do not grow in height and weight at the same time, the percentage gains in height and weight were added together as an expression of total growth. There was no attempt to say what that figure should be, but the children were distributed into four groups, depending on the amount of growth made. Table VI compares the diet ratings with the amount of growth achieved. Although no correlation can be claimed between growth and the quality of the diet, the boarders have made definitely better gains.

TABLE VII

NUMBER OF ILLNESSES CAUSING ABSENCE FROM CLASSES

Cause	Number of Times Absent		Number Days Lost	
	*B	D	*B	D
Cold	4	22	9½	29
Flu	6	15	20	60
Digestive disorders	0	10	0	12
Sore throat	3	7	3	13½
Headache	2	9	2	14
Measles	4	1	47 (2)	8
Miscellaneous (1)	3	19	12	42
Total	22	83	93½	178½

* B, Boarders. D, Day Students.

(1) Included: Missed school bus, a pain in the side, dental work, sick mother, rheumatic fever, felon, impetigo, and croup.

(2) Included eight days quarantine of one student before measles developed.

Table VII shows the cases of illness and the number of days lost from school for the seven months of study. On the whole the day students had almost four times as many illnesses and lost almost twice as much time from school as the boarders. It is possible parents sometimes reported an absence as due to illness when that was not the case. It is not likely, however, that this was done often enough to account for the large differences in the records of boarders and day students. On the other hand, there was no compulsion for the boarders to be present for classes if they claimed illness, although isolation (quarantine for eight days before measles developed) in the infirmary deterred one child who was not really sick.

Colds and flu accounted for almost half of the illnesses for both boarders and day students. The day students had more illnesses of every type except measles. One child returned from the Christmas vacation already ill with measles. Prompt quarantine of this child and her sister probably explains the fact that only two other cases developed. It is interesting that no cases of digestive disorders severe enough to cause absence from school occurred among the boarders, although ten such illnesses were reported among the day students.

Table VIII shows the number of illnesses compared with the diet ratings. For the boarders there seems to be no relationship. For the day students, there were more illnesses among those with the poorest diets. The difference, however, is not great and considering the small number of students, may not be significant.

TABLE VIII

COMPARISON OF DIET AND NUMBER OF TIMES ABSENT

	Boarders		Day Students	
Diet Rating	No.Students	Times Absent	No.Students	Times Absent
1 - 3	0	0	9	52
4 - 5	7	13	8	31
6 - 7	5	9	0	0

Note: The above table averages twelve students. Five of the boarders were not absent at all during the period of study.

The boarders indulged much more often in active physical play than did the day students. This, obviously, was due to the organized schedule for the boarders, which included a certain time each day for active outdoor play, except when the weather did not permit.

The diets of the day students were extremely poor compared with the other studies of the same type. The diets of the boarders were somewhat better. More than half the day students had less than a glass of milk daily; half the boarders had three or more glasses of milk daily, and two-thirds had two or more daily; whereas, Peterson [3] found more than two-thirds of her seventh and eighth grade children in

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3. Agnes B. Peterson, "Food Habits of Sixth and Seventh Grade Children in Ten Elementary Schools of Chicago", Research Quarterly, IX (December, 1938), 77.

Chicago using two or more glasses a day. With high school students Blackman [4] found that more than half the boys and a fifth of the girls had three glasses a day, and Leichsenring [5] found that more than half her high school subjects in Kansas and less than a third of the subjects in Minnesota had less than a glass a day. Sharpe,[6] with the same age group in the same section of the country, found the diets of her subjects similar to the diets of those in this study.

Both Blackman [7] and Coco [8] found, as did this study, that meat was the food which came nearest to the present recommendation.

One-sixth of the day students and over two-thirds of the boarders had the required number of eggs. In contrast, Leichsenring [9] found more than one-fifth of the Kansas and more than one-fourth of the Minnesota diets contained no eggs during the period of study.

In the case of other fruits and vegetables, one-sixth of the day students and all of the boarders had one serving a day. None of

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4. Nina Ruth Blackman, "A Survey of Food Practices of the Eleventh and Twelfth Grade Students in Three North Carolina Communities," Master's Thesis, W.C.U.N.C. (1946), 30.

5. Jane M. Leichsenring, et al, "Diets of 524 High School Girls," Journal of Home Economics, XXXV (November, 1943), 583.

6. Evelyn T. Sharpe, "A Survey of the Diets of the Children in the Fourth, Fifth and Sixth Grades of Curry School," Master's Thesis, W.C.U.N.C. (1947), 42 pp.

7. Blackman, op. cit., p. 30.

8. Lucille D. Coco, et al, "A Study of Adequacy of Diets Consumed by Grade School and High School Students in Louisiana," Louisiana Bulletin, 360, Louisiana State University (January, 1943), 8.

9. Leichsenring, op. cit., p. 583.

the day students, but over half of the boarders, had three servings a day. This was one of the weakest points among the diets of Brendle's[10] subjects.

About half of the day students and all of the boarders had only one serving of green vegetables in three days. None of the day students, although one-third of the boarders reported that amount, had a serving every day. Citrus fruits and tomato were another weak point in these diets, as all of the day students and almost half of the boarders failed to eat as much as one serving every day. This includes between-meal eating.

Among the boarders there may be some relationship between diet and growth. While no definite correlation can be shown, the boarders, with their better diet, made better gains. Two of the day students with medium diet ratings, however, showed excellent total gains in growth. In both cases the greatest gain was in weight, and in both instances the subjects had consumed a large amount of sweets.

There seems to be some relation between diet and illness, as the day students with the poorest diets were ill the greatest number of times. Although no definite correlation can be shown between diet and either growth or illness, the boarders, whose diets were much better than those of the day students, had better health, judging

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10. Cleo Brendle, "Food Production and Consumption Practices in a Group of North Carolina Homes," Master's Thesis, W.C.U.N.C. (1941), 37.

from generally better growth and fewer illnesses.

Throughout the literature, reference is made to the fact that nutrition education should begin with the very young, and very good results have been reported in experiments that have been carried on in different parts of the country. The school lunch room has also played an important part in training children in good food habits. An experiment was carried on in Speyer School with children who needed the protective values found in raw vegetables and whole-grain bread. The Study showed that with care and persistence, food habits which had been faulty could be altered successfully at the elementary level. [11] Bovee and Downes [12] report the results of an education program carried on in New York City with with ninety families who had special nutrition teaching and an additional forty-five families who received no special teaching. The food habits of the children showed significant improvement in all families in which special educational work was done. There was a marked increase in the use of the protective foods - milk, eggs, fruit, vegetables and tomatoes. The habits of the children in the families who received no training showed relatively little change.

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11. Mary Swartz Rose, "Nutrition and Health of the School Child," Journal of American Dietetic Association," XV (February, 1939), pp. 63-85.

12. Dorothy Bovee and Jane Downs, "The Influence of Nutrition Education in Families of the Mulberry Area of New York City," The Milband Memorial Fund Quarterly, XIX (April, 1941), pp. 121-146.

Considering the findings of this study as evidence, it is the opinion of this writer that education with regard to diet would be most beneficial to both the children and the families of the children taken as subjects.

In this study the boarders selected a much better diet than the day students, although there was no great difference in the section of the country from which they came. It is interesting that there were more children from well-to-do families among the day students than among the boarders. The difference in the diet of the two groups is thought due to the supervision given, until this year, in the dining room. That it was effective is shown by the fact that even without it the diet selected by the boarders was much better than that of the day students.

CHAPTER V

SUMMARY AND CONCLUSIONS

A survey was made to reveal the food practices of an equal number of boarding and day students in the Sacred Heart Academy in Belmont, North Carolina. Three-day records were obtained in each of three periods, October, 1946, January and April, 1947. The numbers were small, but a careful study possible.

Because the academy was unable to buy either butter or margarine in October, it was impossible for the boarding student to reach the diet standard set. One of them, however, reached the highest score possible under the circumstances. The diet of the day students was much poorer. Both groups came nearest the standard for meat or meat substitute and failed most often to eat a green or yellow vegetable. The diets of the day students showed too small a variety of fruits and vegetables.

The day students ate more sweets between meals than did the boarders, averaging about three times as many. The day students who ate the greatest amount of sweets tended to increase their weight rather than their height.

The boarders had fewer absences due to illness. Five of the boarders had no illness during the seven months of study. In general the day students were ill almost four times as much as the boarders, and lost about twice as many days of school.

While no definite relationship can be shown between either

growth or absence, the boarders, with a very much better diet, had definitely better health as shown by growth and the number of illnesses during the time of the study.

Recommendations

This study shows the deficiencies in the diets of grade children in the Piedmont district of North Carolina.

The diet records show the need for the inclusion of more green and yellow vegetables in the diets of children studied. This is true with children from both well-to-do and poorer families.

Wise dining room supervision seems to have influence for the better in the diets of the boarding students. It is recommended that some effort be made to influence the day students,also,through classroom work. The effort should be directed toward including a wider variety of foods, especially vegetables.

Interesting differences in growth and health have been indicated in a small number of children. Repetition of the study with more children is needed to determine whether the differences are significant.

A longer growth period is needed in order to adequately compare attainment with the standard tables. Since these studies lasted only seven months, it is difficult to say whether the children did or did not do as well as children of their age can be expected to do.

If the number of children were larger it would be interesting to determine whether diet and health improved for the boarders with length of time at the school, and whether good habits were lost over the long summer vacation.

It would also be interesting to know whether an improvement in diet among day students would result in fewer sweets being eaten.

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APPENDIX

TABLE I

GENERAL INFORMATION

NAME DATE GRADE

HOME ADDRESS

FATHER'S OCCUPATION

AGE DATE OF BIRTH HT. WT.

DAY STUDENT BOARDER RISING TIME BED TIME

ACTIVITIES

Rising Time to Breakfast	Morning	Lunch Time	Afternoon
1.			
2.			
3.			

TABLE II

DIETARY RECORD

NAME _____ DATE _____ GRADE _____

	1st. Day	2nd Day	3rd Day
Breakfast			
After Breakfast			
Lunch			
After lunch			
Supper			
After supper			

TABLE III

DIET RATING FOR EACH PERIOD

BOARDERS

Name	Milk and Milk Prod.	Green and Yellow Veg.	Citrus Fruit or Tomato	Other Fruits and vegetables	Meat or Substitute	Eggs	Butter
B.P.	1 1 1	2/3 2/3 1	1 1 1	1 1 2/3	1 1 1	1 1 1	- 1 1
J.McN.	1/3 1 2/3	2/3 1 2/3	1 1 1/3	1 1 1	1 1 1	1 1 1	- 1 1
L.C.	1 1 1	1 1 1	1/3 2/3 1	1 1 1	1 1 1	1 1 1	- 1 -
C.A.B.	1/3 2/3 1	2/3 1 2/3	2/3 1 1	1 1 2/3	1 1 1	1 1 1	- 1 2/3
N.McI.	1 1 1	2/3 1/3 2/3	1 2/3 2/3	1 1 1	2/3 1 2/3	1 ½ 1	- 1 1
P.F.	1 2/3 1	1 2/3 1/3	1 1 1	1 1 1	1 1 1	1 1 1	- 1 1
J.W.	1 1 1	1 1/3 2/3	1 1 2/3	1 1 1	1 1 2/3	1 - 1	- 1 1
B.J.W.	1 1 1	1/3 1/3 2/3	1 1 1	1 1 1	1 1 1	1 1 1	- 1 1
C.B.	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	- 1 1
K.J.	1 2/3 2/3	1/3 1 2/3	1 1 1	1 1 2/3	1 1 1	1 1 1	- 1 1
J.J.	1 1 1	2/3 1 1/3	1 1 1	1 1 1	1 1 1	1 1 1	- 1 1
P.W.	1 2/3 1	2/3 2/3 1	1/3 2/3 1/3	1/3 1/3 1/3	1 2/3 1	1 1 1	- 1 -
M.L.	1 1 1	1 1 2/3	1 1 1/3	1 1 1	1 1 2/3	1 1 1	- 1 1
T.L.	1/3 1/3 1	1 - 1	2/3 1 1	1 - 1	2/3 - 1	½ 1 1	- 1 1
M.J.L.	2/3 1 1	2/3 2/3 2/3	2/3 1 2/3	1 1 2/3	1 1 1	½ 1 ½	- 2/3 1
M.B.	1 1/3 2/3	1 1 1	1/3 2/3 2/3	1 1 1	1 1 1	- ½ ½	- 1 1
J.McA.	1 1 1	2/3 1 2/3	1 1 1	1 1 1	1 1 1	1 1 1	- 1 2/3

TABLE III

(Continued)

DIET RATING FOR EACH PERIOD

DAY STUDENTS

Name	Milk and Milk Prod.	Green and Yellow Veg.	Citrus Fruit or Tomato	Other Fruits and vegetables	Meat or substitute	Eggs	Butter
A.L.	2/3 2/3 2/3	1/3 1/3 1/3	2/3 1 1	- - 2/3	1 1 1	1 1 1	- - -
N.G.	1 2/3 2/3	2/3 1/3 1/3	- 1 1/3	1/3 2/3 1/3	1 1 1	1 ½ 1	- - -
B.A.	1/3 1/3 2/3	2/3 2/3 -	2/3 2/3 2/3	1/3 1/3 -	2/3 1 1	- ½ 1	1 - -
J.C.	2/3 2/3 2/3	- 2/3 2/3	1 2/3 1	1 2/3 2/3	1 1 1	- ½ ½	- - -
I.R.	1/3 - 1/3	1/3 2/3 1/3	1 2/3 2/3	1/3 1/3 1/3	1 1 1	1 ½ 1	1 1 -
F.H.	1/3 - 1/3	- - 1/3	1 - 1	1 1/3 1/3	1/3 1 1	1 ½ 1	1 - 1
P.O'D.	2/3 - 2/3	- 1/3 2/3	1/3 1/3 2/3	1/3 2/3 -	2/3 1 1	1 1 1	- - -
B.H.	- 1/3 -	1/3 1/3 1/3	1 1/3 1/3	1/3 1/3 1/3	1 1 1	- 1 1	1 1 2/3
A.L.G.	1/3 - ?	1/3 1/3 2/3	1 - -	- 1 2/3	1 1 1	1 - ½	- - - -
E.L.	1/3 1/3 1/3	- - -	- - 2/3	2/3 - -	1 1 -	- - 1	1 1 -
D.V.	1 2/3 1/3	2/3 - -	2/3 2/3 2/3	2/3 2/3 1/3	1 1 1	- ½ -	1 - -
S.McC.	- 1/3 1/3	1/3 1 2/3	1/3 1 -	- 2/3 2/3	1 1 1	½ 1 1	- 1 -
A.H.	- - -	1/3 1/3 1/3	1 1 2/3	1 1/3 2/3	1 1 1	1 - 1	1 1 1
A.M.A.	- - 2/3	- 1/3 -	- 1/3 1/3	1/3 - 1/3	2/3 1 1	- ½ 1	- - -
M.L.V.	- - -	1/3 1/3 -	1/3 - -	1 1 1/3	1 1/3 1	1 ½ 1	1 - -
A.McD.	2/3 2/3 1	2/3 - 2/3	1 2/3 2/3	2/3 1 1	1 1 1	1 1 1	- - -
D.A.	1/3 - -	- 1/3 -	1/3 1 2/3	1/3 2/3 2/3	1 1 1	- 1 1	- - -

TABLE IV

HEIGHT - WEIGHT - AGE - RECORDS

Name	October, 1946 Age Yr.	Mo.	Ht. In.	Wt. Lb.	May, 1947 Ht. In.	Wt. Lb.
Boarders						
B.P.	8	5	51	61	52	69
J.McN.	8	6	50	54	50½	61
L.C.	8	8	51	63	52½	70
C.A.B.	8	10	54 7/8	76	55½	80
N.McI.	8	10	53¼	61	54½	68
P.F.	9	-	51	62	52	70
J.W.	9	2	53 7/8	73	54 1/8	84
B.J.W.	9	5	52 1/8	55	53 1/4	65
C.B.	9	10	52 3/8	69	54 1/8	75
K.J.	10	-	53½	72	54 3/8	80
J.J.	10	5	58	65	59 1/4	74
P.W.	10	10	55 3/8	75	56½	80
M.L.	11	2	58 5/8	87	59½	97
T.L.	11	2	56 5/8	74	57½	82
M.J.L.	11	3	57	67	58 3/4	77
M.D.	11	11	64	98	65	104
J.McA.	12	2	57¼	80	58½	86
Day Students						
A.L.	8	3	56 3/8	73	57	79
N.G.	8	7	49 1/8	57	51	65
B.A.	8	7	58 3/8	70	59 6/8	77
J.C.	8	9	48 7/8	54	49 3/4	60
I.R.	8	10	53¼	53	54	55
F.H.	9	3	48 7/8	44	49½	47
P.O'D.	9	9	51¼	57	52	60
B.H.	10	2	54 3/8	71	55 7/8	77
A.L.G.	10	5	55 3/4	73	57¼	82
E.L.	10	8	56 5/8	77	57 3/8	78
D.V.	10	8	57½	80	58 5/8	80
S.McC.	11	1	55 5/8	69	57 1/8	79
A.H.	11	4	54¼	65	55 7/8	74
A.M.A.	11	5	64 7/8	118	65¼	127
M.L.B.	11	7	56 7/8	86	58 6/8	94
A. McD.	11	9	57¼	67	58½	74
D.A.	13	5	67	114	67 3/8	119

TABLE V

SUMMARY OF DIET RATING - ABSENCES - GROWTH

Name	Diet Rating Oct., 1946	Jan., 1947	April 1947	Average	Number Illnesses	No. Days Absent	% Expected Yr. Gain Ht.	Wt.	% Expected Yr. Gain-Growth
					Boarders				
B.P.	5.4	6.4	6.7	6.2	1	11	50	133	183
J.McN.	5	7	5.7	5.9	2	5	25	116	141
L.C.	5.3	6.7	6	6	-	-	50	116	166
C.A.B.	4.7	6.7	5.9	5.8	1	5	50	50	100
N.McI.	5.4	5.5	6.1	5.6	1	1	62	87	149
P.F.	6	6.4	6.3	6.2	-	-	100	160	260
J.W.	6	5.3	6.1	5.8	1	5	12	157	179
B.J.W.	5.3	6.3	6.7	6.1	2	15	50	143	193
C.B.	6	7	7	6.7	3	4½	100	86	186
K.J.	5.3	6.7	6.1	6.4	-	-	50	133	183
J.J.	5.7	7	6.3	6.3	-	-	62	82	144
P.W.	6	5.3	6.1	5.8	4	13	50	62	112
M.L.	6	7	5.7	6.2	1	9	50	100	150
T.L.	4.2	*3	7	5.6	2	**20	50	80	130
M.J.L.	4.6	6.2	5.6	5.5	2	3	87	100	187
M.B.	4.3	5.5	5.9	5.2	-	-	50	66	116
J.McA.	5.7	7	6.2	6.3	2	2	42	60	102

* Winter column not included in average due to case of measles.

** Included eight days quarantine before measles developed.

TABLE V

(Continued)

SUMMARY OF DIET RATING - ABSENCES - GROWTH

Name	Diet Rating Oct., 1946	Jan., 1947	April 1947	Average	Number Illnesses	No. Days Absent	% Expected Yr. Gain Ht.	Wt.	% Expected Yr. Gain-Growth
Day Students									
A.L.	3.7	4	5.1	4.3	6	17	50	75	125
N.G.	4	4.2	3.6	3.9	4	6½	50	200	250
B.A.	3.7	4.2	3.4	3.8	7	9	62	87	149
J.C.	3.7	4.3	4.2	4.1	1	4	87	150	237
I.H.	5.6	4.5	4.3	4.8	5	10	37	25	62
F.H.	5.3	2.5	5.6	4.5	1	1	62	60	122
P.O'D.	3	4	4.1	3.7	16	28	75	33	108
B.H.	3.6	4.2	4.1	4	4	7	75	75	150
A.L.G.	2.9	3.2	3.2	3.1	3	7	75	112	187
E.L.	3	2.5	2.7	2.7	7	33	37	12	49
D.V.	4.1	3.6	2.3	3.3	1	1	50	73	123
S.McC.	2.1	6	4.7	4.3	7	23	75	100	175
A.H.	5.6	4.3	5.4	5.1	2	4	81	100	181
A.M.A.	1.7	2.6	3.3	2.6	5	8	16	69	85
M.L.B.	4.6	2.6	1.3	2.8	3	4	93	80	173
A.McD.	5.1	4.4	5.4	5	5	6	62	70	132
D.A.	2.2	4	3.4	3.2	6	10	20	62	82